

MEMORANDUM



MWH

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To:	Project Team Members	Date:	11/13/01
From:	Montgomery Watson Harza Dallas, Texas	Reference:	10/15/01 & 10/16/01 Bosque and Leon Rivers Watershed Study Public Meetings
Subject:	Meeting Notes		

The following is a final copy of the meeting notes from the events and issues discussed during the perchlorate project public meetings held in Waco, Texas on October 15, 2001 and in Temple, Texas on October 16, 2001. The topics are organized in the same order as the meeting agendas, which are attached. Both meetings were held in similar formats and discussed the same topics. The power point presentation used for the both meetings can be accessed through the project web page at the following web address:

<http://www.swf.usace.army.mil/links/ppmd/perchlorate/index.html>

Attendees:

United States Army Corps of Engineers – Fort Worth District (USACE) - Brian Condike, Wayne Elliott, and Anita Horky

Brazos River Authority (BRA) - David Collinsworth and Mike Meadows

Montgomery Watson Harza (MWH) – Dave Ebersold, Ron Hartline, and Kristie Witter

The Institute of Environmental and Human Health at Texas Tech University (TIEHH) - Todd Anderson

Texas Natural Resource Conservation Commission (TNRCC) - Mike Honeycutt

Environmental Protection Agency (EPA Region 6) – Jeff Riley

City of Waco – Rick Howard

Others: see attached list of attendees

- I. Welcome and Introduction of Team Members– Mr. Condike
- II. Power Point Presentation – Mr. Condike, Mr. Meadows, Mr. Honeycutt, Mr. Ebersold, and Dr. Anderson. See power point presentation available for review at the web page link previously listed.
- III. Question and Answer Period

The USACE provided a stenographer for the Temple, Texas meeting. A complete transcript documenting the information covered in this meeting is attached for further detailed review. This transcript is also representative of the information presented in the Waco, Texas meeting since the same presentation materials were utilized at each meeting.

Questions and Answers:

The following questions and answers are from the October 15, 2001 public meeting in Waco, Texas. The questions and answers from the October 16, 2001 meeting in Temple, Texas are included on the attached transcript.

Question (Unidentified) Have you referenced bioaccumulation and have any studies been conducted on the sick-thyroid syndrome?

Response by Dr. Todd Anderson:

It is being looked at in Frogs and tadpoles – they don't go through metamorphosis.

Question (Unidentified) Are you evaluating the water and tissue for any other pollutants?

Response by Mr. Brian Condike:

No. Our government mandate limits us to perchlorate.

Question (Unidentified) It appears that the perchlorate levels are significantly lower in fillet samples than the heads. Is this true?

Response by Dr. Todd Anderson:

Yes, they are an order of magnitude in difference. 2000 ppb verses 200 ppb.

Question (Mayor Linda Ethridge)

For the interim standard of 4 ppb that does not presently have a course of law, what advice would he give for drinking water?

Response by Dr. Mike Honeycutt:

It would depend upon the level. The higher the level, the higher the concern. 4 ppb is right at the detection limit. If it were close to the detection limit, we would recommend re-testing. Significantly higher, we would recommend bottled water for drinking and cooking – but bathing is fine. Perchlorate is not absorbed through the skin. We do not anticipate seeing perchlorate at these higher levels.

Question (Unidentified) Have you looked at tissues in livestock that may be using this water?

Response by Dr. Todd Anderson:

We haven't but we intend to look into larger animals.

Question (Unidentified): Are some of the high values associated with seasonal discharge?

Response by Dr. Todd Anderson:

It really depends upon the stream. There do seem to be some seasonal occurrences. The places where there is always flow, you can pick up perchlorate. Onion creek did not pick up perchlorate. It's strictly related to the volume of water.

Response by Mr. Dave Ebersold:

This is one of the key issues of the conceptual site model, to study the difference between seasons and flow. This is one of the items we were currently looking at.

Comment by Mr. Brian Condike:

A lot of the questions that you all are asking – are the same ones we are asking.

Question (Mayor Linda Ethridge)

Is there a means yet in a standard water treatment plant, to remove perchlorate?

Response by Mr. Brian Condike:

The technology is there but the cost is very high.

Question (Unidentified)

It seems that there has been a tremendous reduction in the interim action level. Can you comment on how that affects the Navy's discharge permit?

Response by Dr. Mike Honeycutt:

At this time we do not know.

Question (Unidentified)

Are there other states looking at taking reductions?

Response by Dr. Mike Honeycutt:

California is looking into reductions as well.

1 UNITED STATES ARMY CORPS OF ENGINEERS
2 BOSQUE AND LEON RIVERS
3 PERCHLORATE STUDY PUBLIC MEETING

4 *****

5 OCTOBER 16, 2001

6 *****

7 MR. CONDIKE: Good evening. Welcome to the
8 second of two public meetings presenting the Perchlorate Study
9 of the Bosque and Leon River. Thank you for coming out
10 tonight. We have a nice turnout.

11 I'd like to start off first by recognizing the
12 team members on our studying team and some of the other folks
13 that are here from various organizations. I am Brian Condiكه.
14 I am with the U.S. Army Corps of Engineers from Fort Worth. I
15 am project manager for this study. With me tonight from the
16 Corp is Wayne Elliott, also from Fort Worth. He is in our
17 environmental division. Robert Adams is here from the Little
18 River project office. Robert. And Greg Holt from the Belton
19 and Stillhouse Hollow Lakes.

20 Representing the Brazos River Authority is
21 Mr. Mike Meadows in the front row. David Collinsworth.
22 David. And representing Texas Tech University, the Institute
23 of Environmental and Human Health, Dr. Todd Anderson. From
24 the TNRCC tonight is Dr. Todd Anderson -- I'm sorry, wrong
25 line, Dr. Mike Honeycutt. Mike, sorry. And a representative

1 from Montgomery Watson Harza is Dave Ebersold from Pasadena,
2 Ron Hartline from the Dallas office. And Kristie Witter, also
3 from the Dallas office.

4 We have a wide variety of folks representing a
5 lot of public organization here, and I have a list. But if I
6 recognized everyone I'd have each and every one of you
7 standing, but I thank you for coming.

8 I would like to welcome Mayor Keifer Marshall
9 from Temple. Would you like to come up and say a couple of
10 words to us?

11 MAYOR MARSHALL: Thank you, Mr. Condike. I am
12 invited to be here on behalf of our 55,000 people in Temple
13 and 500,000 people that use the Belton lake as our water
14 supply. We found out about this Perchlorate problem about two
15 years ago and we went to Washington. I think, Mike, you were
16 with us, from the Brazos River Authority. And we had people
17 from Harker Heights. We got Mary Gauer, Mayor of Harker
18 Heights, with us and people from Killeen and from Belton and
19 from Temple. And got Chet Edwards to have -- get us a meeting
20 with the Navy Department and started talking about
21 Perchlorate.

22 Out of that meeting, I think there was
23 three-and-a-half million dollars Chet got us to try to help be
24 sure what the problem was, if there was a problem, and how
25 extensive the problem was. So on behalf of the City of

1 Temple, I thank all of Bell County. I am very grateful for
2 this group you've gotten together. And I want you to know
3 that any way that we in Bell County can help you, we want to
4 help you and clear up -- if there is a problem, we want to
5 know about it and we want to clear it up if we possibly can,
6 because, again, this is our only water supply. We don't have
7 any other. We got 500,000 people that depend on Lake Belton.
8 And I'm a little sensitive about Lake Belton and Lake
9 Stillhouse Hollow. I always lived in Temple all my life.

10 In 1955, we were able to get some funding to
11 build Belton Dam. And then in 1961 we got funding to build
12 the Stillhouse Hollow Dam. And we got great water all the way
13 around us in Bell County and anything we do to help us protect
14 it, we want to do that.

15 And we also have with me tonight Randy Holly,
16 our assistant city manager. And I don't see anyone else here from the
17 different cities, but we are just delighted to have this
18 meeting and look forward to working with you. Thank you.

19 MR. CONDITE: Thank you, Mayor. The mayor
20 mentioned representative Chet Edwards, and we have from his
21 office Stephanie Gibson. Stephanie. Representing the State
22 Representative Delisi's office, Ms. Kris Augenstine. And the
23 honorable Mary Gauer from Harker Heights is here, also.

24 We'd like to say a few words tonight. There will
25 be several members of the team get up and give brief slide

1 presentations. First, Mike Meadows from the BRA will get up
2 and give us a little history of perchlorate and its history in
3 these watersheds. I will come back and tell you a little bit
4 about the overview of our projects. Mike Honeycutt from TNRCC
5 will talk about the regulatory perspective of Perchlorate.
6 Todd Anderson from Texas Tech University will talk about his
7 ecological studies of fish and animals. And Dave Ebersold
8 from Montgomery Watson will talk about the overall watershed
9 survey.

10 We will be holding questions till the end. We
11 will have an opportunity for people to get up in the audience
12 and ask questions, and team members will be available to
13 answer your questions from the group. And we'll also hang
14 around after the meeting if you want to approach us one-on-one
15 and talk to us individually.

16 If anyone has a cell phone, if they could turn
17 them off. And we do have a court reporter here today to
18 record the proceeding, so if people would speak up when they
19 ask questions and use a microphone. We have a microphone here
20 in front of the audience to ask a question.

21 And with that, Mike Meadows.

22 MR. MEADOWS: Thank you, Brian. I am
23 Mike Meadows, environmental section manager for the Brazos
24 River Authority. And as Brian said, I would like to welcome
25 you on behalf of the Brazos River Authority.

1 One thing Mayor Marshall didn't tell about the
2 meeting in Washington, they had a record snowfall that day,
3 about eight inches of snow, and we were delayed an extended
4 period of time trying to get the Navy officials from the
5 Pentagon over to Congressman Edwards' office. Stephanie, on
6 behalf of your authority and all the folks here, we want to
7 thank the Congressman's efforts. He's gone beyond the call of
8 duty in helping to get funding for this project and taking a
9 strong lead in Washington with Senator Hutchinson. We
10 appreciate that, along with Diane Delisi and her staff here in
11 Central Texas helping us at the State level. And we
12 appreciate that.

13 Looking out in the crowd, most of y'all have had
14 some part in making this study materialize and helping with
15 the success of that. All the Waco folks, Killeen, Copperas
16 Cove, they've all shown up, everybody's been in the meeting
17 and helped expressed our need to have this done to protect
18 waters in Central Texas.

19 What I'd like to do is give a brief overview of
20 what is perchlorate. Why are we even talking about
21 perchlorate? What is perchlorate doing in the environment?
22 How does it affect people? How does it affect animals? Water
23 limits of Perchlorate. How did it come about? And the
24 National Defense of the United States, we have a defense
25 missile system. In addition to this, we have the space

1 program, space shuttle, put satellites in outer space. And
2 when you go in the upper levels of the atmosphere in outer
3 space, there's not oxygen for combustion. So they pack the
4 rocket engines with a compound called ammonium perchlorate.
5 Perchlorate, or ammonium perchlorate when it goes into the
6 environment, it disassociates and the ammonium becomes
7 nitrogen nitrate. But Perchlorate stays -- stays in the
8 environment for a long period of time. And this is what it
9 looks like chemically with one atom of chlorine surrounded by
10 four atoms of oxygen. And that's an oxygen source. Whoever's
11 driving the space shuttle hits the ignite button to bring it
12 back into Earth. It's got an oxygen source for combustion.

13 Let me define. It's an inorganic salt used as an
14 oxidizing compound in rocket engines. It's used in fireworks,
15 used in pyrotechnics. But it has a shelf life kind of like
16 things in your refrigerator, or after they have been there too
17 long in my daughter's refrigerator at college you got to get
18 them out. So they got the Perchlorate -- or ammonium
19 perchlorate out of those rocket engines.

20 And years gone by it was accepted practice to let
21 that material be washed out of those engines flow into a
22 nearby creek or in an underlying lagoon. That practice has
23 changed -- since changed, and changed pretty dramatically.
24 But that is what was accepted at the time that it was done.
25 And we know that amounts of perchlorate were used near

1 ammunition plants around the United States. This is a picture
2 that shows an actual rocket being washed out -- or what we
3 call hogged out. They use a high pressure hose or apparatus,
4 and they get up in those engines and wash that ammonium
5 perchlorate out.

6 Perchlorate is just like table salt in your home.
7 If you put it in a glass of water and shake it up, it
8 disappears. That's kind of what perchlorate does, except it
9 stays there pretty much forever. Once it dissolves, it's very
10 stable. There's been perchlorate used at the Navy site of
11 McGregor since 1952, and we are still measuring perchlorate
12 today coming off of that site.

13 It moves very easily through water. It's almost
14 like this arrogant chemical. It leads the way. And if you
15 find perchlorate -- you might even look for other things --
16 but if perchlorate leaves the site and goes a distance of
17 several miles or 10 miles, or in cases in California where
18 it's gone 250 miles, you still measure those same levels at
19 the end.

20 This is a map of the United States where EPA says
21 they have known releases of perchlorate in the environment.
22 What I want to show you is this is not just a simple Texas
23 issue. This is a national issue. California was kind of on
24 the cutting edge of finding perchlorate around ammunition plants
25 first then spread into Nevada and Arizona and New Mexico and

1 Texas and across the United States. EPA has shown either
2 perchlorate users, manufacturers in all the states that are
3 shown in the orange-pink. We expect that as the levels of
4 allowable perchlorate go down in the environment, we will see
5 more and more states go on that perch map.

6 Again, perchlorate is used -- 90 percent of it's
7 used in rocket engines, used in explosives, pyrotechnics and
8 fireworks. They even reported in some fertilizers that came
9 in from Chili. I'm also understanding perchlorate is used in
10 airbags and that's what makes them expand so fast when you are
11 in an accident.

12 As far as what it does from a toxicology
13 standpoint -- and Dr. Todd Anderson is here tonight from Texas
14 Tech, and he will go into that, and Mike Honeycutt with TNRCC,
15 with a lot more details -- but what EPA tells us is that it's
16 a thyroid disrupter. If you administer iodine in your body
17 and it stops your thyroid from uptaking iodine and it uptakes
18 perchlorate, and in some cases like with expectant mothers,
19 that reduces drug hormones and hormones that
20 (unintelligible) -- so it's very important to figure out how
21 much can be in drinking water, how much can we consume, and
22 what are the affects of that.

23 It was actually used in human drug tests back in
24 the '50s to treat thyroid problems. The EPA had said that the
25 provisional dosage that was between 4 and 18 ppb, but as you

1 may know this past week, that level has been lowered by TNRCC
2 to 4 ppb in drinking water in Texas.

3 Recently there was a study done comparing
4 expectant mothers who drank water with 6 ppb of perchlorate in
5 it in Yuma, Arizona out of the Colorado River versus expectant
6 mothers who drank water with no perchlorate in it from
7 Flagstaff, Arizona. And there was very high levels of
8 thyroidism in newborn babies in the expectant mothers in Yuma.
9 So the report -- and there are many of these reports. So you
10 have to take each of those and weigh them with the facts that
11 show that the perchlorate at low levels was passing through
12 the placenta of the expectant mothers into the children. So
13 there's high uncertainties here, but that is part of the work
14 we are trying to do.

15 Effects out of the environment -- the work that
16 Texas Tech's done -- and, again, Dr. Anderson will go into the
17 details of what's been done here in these watersheds. And
18 Tech, I have to say, is on the cutting edge of perchlorate
19 studies nationwide. People are coming to their door asking
20 questions now. But there is a direct influence on
21 developmental aspects of deer mice, frogs that are exposed to
22 high levels of perchlorate. We did some fish studies showing
23 that there was bioaccumulation of perchlorate in fish tissue.
24 And air -- in Colorado, there was some water irrigation in the
25 Yuma area on lettuce. They found that the lettuce did uptake

1 perchlorate and there was shipping lettuce out to be sold in
2 stores with some perchlorate. So that's the work Texas Tech's
3 doing, and we're very fortunate to have them on our team.

4 As far as treatment for perchlorate -- and this
5 is very important -- in Central Texas, in Temple and WCID and
6 cities around here, conventional water treatment plants will
7 not remove perchlorate. Whatever levels of perchlorate come
8 in through drinking water, sources through treatment plants go
9 out the other end of the plant at the same level. There are
10 some technologies now in place in order to remove perchlorate.
11 Calgon has designed an ion exchange system. This anaerobic,
12 bioremediation system where you create an environment without
13 oxygen and you [unintelligible] a bacteria, and it actually
14 consumes perchlorate and breaks it down to a product that's
15 not harmful to the environment.

16 I want to be very careful to say, though, and be
17 very clear on this, none of the water treatment systems in
18 Central Texas from Lake Belton or Lake Waco have measured
19 perchlorate in the drinking water. We've been very fortunate.

20 These are a couple of e-mail addresses. There's
21 handouts on the sign-in table. We have all of these. All of
22 these slides -- and Brian will cover this -- are on the
23 website for this project. So you can go and pick these things
24 up.

25 How does perchlorate end up in Central Texas?

1 Some years ago, in 1998 -- June of '98, the City of Waco
2 measured high levels of nitrates in the South Bosque River and
3 Harris Creek area. And looking on this map, it's between the
4 side of Lake Waco. It's about right in this area. And they
5 asked the Brazos River Authority, the Institute for
6 Environmental Studies Tarlton, Baylor University to form a
7 team to study why these nitrates were there.

8 If you recall at the first of the presentation, I
9 mentioned ammonium nitrate. This ammonium strips off and
10 becomes nitrogen nitrate. And we were measuring nitrate, and
11 we actually measured it right up to the fence line of the
12 facility. At the same time we were learning from the
13 California folks that they had experienced the same thing.
14 And by testing for the other perimeter for perchlorate they
15 found it present.

16 The City of Waco collected a sample at
17 Old Oglesby Road and Highway 4 and found perchlorate at about
18 100 ppb at that site. And this was the first time we had
19 perchlorate measuring outside the fence of a facility. The
20 issue wasn't necessarily the amount of perchlorate we were
21 measuring initially, but the presence that something was
22 leaking off that site.

23 On this map at the Number 2 is where the first
24 perchlorate was measured. But each of those red dots is now
25 sites where perchlorate has been measured away from the

1 facility. Looking at the map, this watershed line kind of
2 represents the facility set up on a hill. And everything from
3 this line back this way drains towards Lake Belton. And from
4 this line in this direction drains towards Lake Waco. And
5 we've measured perchlorate up to the boundaries of both
6 reservoirs. There have been two positive perchlorate reads in
7 Lake Belton and one downstream of Lake Belton and one that was
8 measured in Lake Waco. This is a close-up of the site that's
9 about 9000 acres, originally. Some of these sites have been
10 cleaned up and transferred to the City of McGregor. But each
11 tributary leaving the site, Harris Creek, this creek --
12 unnamed tributary, South Bosque River, Onion Creek and Station
13 Creek have all measured positive for perchlorate, and
14 Montgomery Watson will go into detail.

15 Again, there was a stakeholders group formed very
16 early on, 19 water agencies in Central Texas that either use
17 Lake Waco water, Lake Belton water, groundwater or a
18 combination of both. These -- all of these communities have
19 supported this investigation. And in addition to that it
20 included Bell County and McLennan County health departments.
21 So it's been a partnership. It's been a group effort, but I
22 think now we are starting to see the value of staying together
23 and working on this as a team.

24 At this point, Brian, I will shift back to you.

25 MR. CONDITE: Thank you, Mike. I'm short. He's

1 standing way up here with the microphone way below his chin.

2 All right. But the major players in our team are
3 the Corps of Engineers, who I represent. The role we play is
4 project management and support.

5 TNRCC, they advise the study team. They liaise
6 with the Interagency Perchlorate Steering Committee, and they
7 give us a regulatory perspective on how perchlorate is
8 regulated.

9 The Brazos River Authority, they provide some
10 technical service to us, but their major role is coordinating
11 with all the 19 stakeholders that Mike just talked about.

12 The Institute of Environmental and Human Health
13 at Texas Tech University, they're performing other
14 toxicological studies, ecological studies. Texas Tech folks
15 are leaders in this research based upon the work that they
16 have done and up at the Red River Army Depot.

17 Montgomery Watson Harza is our primary
18 contractor. They have extensive experience in studying
19 perchlorate based upon work they are doing in California.
20 They will be responsible for the watershed hydrological
21 studies, fate and transport perchlorate, and modeling.

22 Environmental Protection Agency is also on our
23 team, gives us another regulatory perspective.

24 And the Stakeholder Consortium. We have some
25 representatives, one from the City of Waco one from Bell

1 County.

2 I am just going to talk briefly about the
3 authority to funding that permits to us does this type of work,
4 our overall project goal and our individual project
5 objectives. In fiscal year 2001, Congress appropriated
6 \$4,000,000 and put it in the Water and Energy Appropriations
7 Bill telling us [unintelligible] to coordinate with other
8 Federal agencies in the ERA to assess the perchlorate in the
9 area around the Naval Weapons Plant.

10 Someone asked me last night are we studying other
11 pollutants. No, the law here is specific. You can only study
12 perchlorate. So this is all we are looking at, and that seems
13 to be the main concern.

14 The overall project goal, we had a team meeting
15 in February. And the team got together with a very concise
16 goal. And we are going to evaluate the potential for human
17 and environmental exposure into perchlorate in Lake Waco and
18 Belton study area, which is also the Bosque and Leon River
19 watersheds. The map on the side here is basically the study
20 area here where Lake Waco on the north and Lake Belton on the
21 south, Fort Hood bordering the south, and Naval Weapons Plant
22 is in the center. As Mike said, there was a watershed
23 boundary following this line right here.

24 Individual objectives we have are to develop an
25 effective community relations plan. And this public meeting

1 and one we had held last night in Waco is a partner of that
2 plan and plan to keep the public informed. We do have a
3 private website, which is listed on our other slide, so people
4 can keep addresses on projects.

5 Right now we are in the phase of compiling all
6 the existing data information there is out there on these
7 watersheds about perchlorate and the issues such as water
8 flow.

9 After we figure out what data there is out there,
10 we determine what data is not out there, what we call data
11 gaps. That helps us to find a conceptual study model or how
12 all of these things interact. And once we do that, we will
13 collect the data and fill the data gaps and try to evaluate
14 the fate and transport -- fate of perchlorate is, once again,
15 how it gets into the environment, what happens to it, and
16 transport once it gets into the environment, where does it go
17 and how does it moved from one spot to another. And we
18 will then evaluate potential of the environment exposure to
19 perchlorate. That is, the exposure of plants and animals to
20 perchlorate in the area. That and the other information we
21 have helps us to evaluate potential for human exposure through
22 drinking water through consumption of plants and animals in
23 the watershed. And at the end we will try to give some
24 overall recommendations to protect the water.

25 I'm turning it over to Mike Honeycutt with TNRCC.

1 Mike.

2 MR. HONEYCUTT: Good evening. My name is Mike
3 Honeycutt. I'm a toxicologist with TNRCC in Austin. I've got
4 my contact information here. Feel free to take this down,
5 give me a call or send me an e-mail if you have any questions
6 that you need answered.

7 This issue of perchlorate is so huge and far
8 reaching, I'm just going to try to condense it down. And in
9 the previous talk Mike did an excellent job of giving you a
10 background and introduction to perchlorate. And he noted very
11 correctly that with perchlorate, the major thing we are
12 concerned about is water contamination because of its
13 excitability in water.

14 Perchlorate first came to the national forefront
15 back in '97 when the State of California developed a
16 [unintelligible] that lowered detection of perchlorate from
17 400 ppb down to 4 ppb in water. And people started looking
18 for it and finding it in their military facilities.

19 At that point, the Interagency Perchlorate
20 Steering Committee was formed. IPSC is a group of regulatory
21 agencies and other agencies that the EPA, Department of
22 Defense, State, that came together, came up with a lot of
23 money to study perchlorate. We looked at analytical --
24 developing better analytical methods for perchlorate,
25 developing future technologies for remediation of

1 perchlorate -- at that time we didn't think there was one --

2 and also toxicology studies of perchlorate.

3 At that point in time we knew quite a bit of

4 information about perchlorate, but really not nearly enough,

5 based on the level of contamination that we were finding in

6 the environment. Well, those studies -- Human Health

7 Toxicology Studies have been completed. EPA is reviewing that

8 data. And in the spring of this coming year they are supposed

9 to release what we call a reference dose of perchlorate and

10 that's just a fancy term for how toxicologists evaluate what

11 an acceptable level of perchlorate in the environment should

12 be.

13 As part of the studies, they also are going to

14 release toxicology studies that are under way. And also,

15 Texas Tech -- you have heard people say this before, but take

16 it from me, they are the leading people in the field of

17 toxicology of perchlorate in the country, and those studies

18 are under way. And Todd will talk about those.

19 Okay. So a regulator, water is not water is not

20 water. We like to compartmentalize things and put them in

21 different groups. For -- as far as I am concerned, there is

22 different kinds water, drinking water. And that is water that

23 comes into your household from a public drinking water supply

24 or water you utility. The EPA regulates the allowable levels

25 of chemicals in water through what is known as Maximum

1 Contaminant Level, or MCL. For perchlorate there is to MCL.
2 There is -- right now there is really not enough data for EPA
3 to develop a MCL. So in the meantime, TNRCC has developed
4 what we term an interim-action level. For perchlorate that
5 number is 4 ppb. Now the MLC carries regulatory weight. We
6 can basically stop suppliers from severing water if they try
7 to or persist in serving water or drinking water above the
8 MCL. The interim-action level doesn't carry this weight.
9 It's merely an advisory level. You may be familiar with the
10 22 ppb that we developed early on. And we recently revised
11 that to 4 ppb.

12 Another kind of groundwater that we looked at --
13 or another type of water we look at is groundwater. If a
14 responsible party spills a chemical, gets into the
15 groundwater, we develop what we call groundwater cleanup
16 standards that responsible parties must clean that contaminant
17 down to. For perchlorate, again, that number is 4 ppb for
18 what we term residential groundwater. And this is groundwater
19 in an area where the public can have access to it.

20 In areas that are designated commercial
21 industrial where there is a commercial industrial facility
22 where the public don't really have access, that number is
23 7 ppb.

24 Another type of water that you also look at is
25 surface water and that's water like in Lake Belton, Lake Waco.

1 And we've also established a surface water criteria, 4 ppb for
2 perchlorate.

3 That's the end of my brief talk and I'll be
4 around for questions after this.

5 MR. ANDERSON: Good evening. I certainly
6 appreciate the opportunity to be here, Todd, or this evening,
7 to tell you about some of the work we have at Texas Tech
8 University dealing with the potential environment impact of
9 perchlorate. We are a proud member of the team that's been
10 assembled by the Corps. And our role within the team is
11 basically to assess the potential environmental impact in
12 preparing areas in the -- Lakes Waco and Lake Belton
13 watersheds.

14 What this means, basically, is that the Institute
15 has done some pretty pioneering work on looking at using
16 wildlife as sentinels and using wildlife to evaluate the
17 effectiveness of different types of cleanups that might be
18 implemented on industrial facilities. And we've worked with
19 private companies. We work with Department of Defense
20 facilities, all kinds of different parties in doing this kind
21 of evaluation. And what it does is in one sense it provides
22 the responsible parties with some indicative of what the
23 priorities are as far as clean up. But it also provides
24 information to the public as to what the risks are associated
25 with some of the activities. And in this particular case, we

1 are talking about activities at the inward facility.

2 So as I mentioned, what we're trying to do is
3 assess the risk. And we are focusing on environmental -- the
4 environment risk. Most of the work that we do is related to
5 wildlife species and trying to protect wildlife species. But
6 some of that work, also -- as Brian mentioned -- some of that
7 work is the implication of human health, especially if those
8 wildlife species are consumed or used in some way.

9 So what we do basically within Texas Tech or
10 within the Institute, we also have a team of people. And that
11 team is assigned to us with different types of backgrounds
12 that try and put together pieces of the puzzle to answer the
13 risk question. And risk is a function of exposure and effect.
14 In some cases you don't have any risk because you have never
15 really been exposed to a potentially harmful substance. But
16 in some cases you don't have any risk because you are exposed
17 to things, but they don't enlist some sort of biological
18 effect. So what we're trying to do is anticipate the
19 questions, put the exposure and the effect portion of the
20 equation together to answer risk at least in environmental
21 issues.

22 So we have a team of people. That team includes
23 analytical chemists, including biologists, it includes
24 modelers -- as Brian mentioned, a little bit about Montgomery
25 Watson's role in modeling some of the watershed processes. We

1 also have a modeling [unintelligible] that deals with modeling
2 the effect to individual organisms or populations of organisms
3 so that that sort of model can be coupled with the fate
4 transport model that Montgomery Watson might develop so we can
5 overlay fate transport information with the effects
6 information.

7 So there are two main questions in the early
8 portions of the study from our perspective, and that is who or
9 what is being exposed and where do those exposures occur. So
10 as part of that, we have some water quality analyses that we
11 do. We have some dietary analyses that we do, collecting
12 potential food items for various critters. And then also some
13 collections of organisms to look at tissue residue analyses.
14 And essentially the first portion of the study is to look at
15 the exposure side of the equation. And eventually, as we
16 move -- as we get the exposure side of information and find
17 out who is being exposed and where those exposures occur,
18 we'll transition to more of the effect side of the equation.
19 Have those exposures had an adverse environmental impact on
20 organisms that occupy those comparing areas?

21 I want to talk a little bit about some of the
22 water quality analyses that we've done. And I will highlight
23 those three particular areas, one of which is more germane, I
24 guess, to the Lake Belton area.

25 We have been collecting water samples from a

1 variety of places, including -- this is Willow Creek at
2 Highway 317. This is an area that we call the North Branch at
3 the South Bosque on Highway 317. And then I also show some
4 data from Station Creek at Highway 107.

5 This first set of data are from Willow Creek at
6 Highway 317. And it basically shows that in some cases
7 depending on whether there's flow in the river or flow in
8 these areas, you can pick up perchlorate at different
9 concentrations. And in some cases we go out there and not
10 pick up perchlorate and it varies between time of the year and
11 those types of things. But at least at Willow Creek, as it
12 crosses Highway 317, concentrations of perchlorate are
13 relatively low -- you know, as high as maybe 35 ppb in some
14 cases. But for the most part, you know, 20 ppb or so.

15 If you contrast that to what we call the North
16 Branch of the South Bosque, the concentrations are
17 dramatically higher. Some of our early samples we did back in
18 March are pretty low concentrations. But then as we went
19 through the summer months, at least when there was flow, had
20 some pretty dramatic concentrations upwards to a half a part
21 per billion of perchlorate moving off of that facility.

22 And then this is, I guess, data that is probably
23 more germane to this part of Central Texas. This is Station
24 Creek at Highway 107. First time we sampled there it had the
25 highest hit of any of the other samples that we had collected,

1 to 150 ppb, but since then it's gone down. And there have
2 been cases -- at least this summer -- where there wasn't a lot
3 of flow in Station Creek and we couldn't get any samples. But
4 there were also cases where we had non-detects, at least
5 through most of the summer. Now we are starting to get more
6 flow in there and started to pick it up again. And it seems
7 to be diluted as it moves towards the Leon River. We sampled
8 also at Station Creek as it gets closer to Mother Neff Park
9 and the Leon River. And we haven't picked up perchlorate in
10 those samplings.

11 One of the things we've also done is collected
12 fish. And the initial collection of fish was back in May.
13 And that is a time when there was active flow in the water or
14 in the streams that we were collecting from. And we shocked
15 fish at various locations. And we were focusing on where we
16 had picked up perchlorate in the past. We analyzed the heads
17 from those fish because, one, they weren't really big enough
18 to fillet, and, two, again, the questions that we had were
19 more related to environmental health as opposed to human
20 health.

21 We -- one of the concepts in toxicology is that
22 the smaller something, the larger its surfaced to volume ratio
23 is. So small organisms tend to be exposed to -- tend to
24 accumulate a greater exposure. That's essentially why we
25 don't do toxicology tests with elephants, but use rats of some

1 kind because they are small and they're more relevant to what
2 kind of dose they would get.

3 But when you have a small organism, you don't
4 really have a big sample size or a large sample, so in some
5 cases you can't detect perchlorate or other contaminants in
6 small, small organisms. So we focused on -- or we didn't
7 focus on -- we officially collected [unintelligible] so small
8 that we just cut the heads off and analyzed them. And
9 analysis of the perchlorate in tissue samples is not a trivial
10 task. There is a lot of -- it's an ion. And there's a lot of
11 ions floating around in the environment. So the background is
12 high. So detecting an ion against a background of other ions
13 is a challenge. The water -- the development of a method to
14 test the water is only part of the story, as least as far as
15 tissues go. Trying to detect it in tissue samples is an
16 analytical challenge.

17 So we found pretty high concentrations of
18 perchlorate in some fish tissue, which is pretty surprising
19 because the placement where we shocked were relatively large
20 distances away from the facility itself, because that's where
21 you get a pool that's big enough that you can actually shock
22 some fish out of it. Some of those concentrations on a dry
23 week basis were up to 2 ppm in some of the fishes. If you
24 convert that to a wet weight, which is more, I guess, relevant
25 to what somebody would consume on a fillet basis, those

1 concentrations are around a part per million at the highest --

2 probably between 200 and 600 ppb in the tissues.

3 So that was somewhat alarming. And so we went

4 back and focused another round of fish collection unrelated to

5 the fillet tissues. And these were casual size fish that

6 people would eat. And we focused on strictly the fillets, the

7 edible portion of the fish tissue. We collected cat fish,

8 large mouth bass, focused primarily on areas along the South

9 Bosque and then areas along Station Creek as it drains into

10 the Leon River.

11 Those concentrations were considerably lower and

12 considerably less frequent in the detection. For example, we

13 caught 16 large mouth bass from one location. Only one of

14 them came up positive for perchlorate. So that's good news

15 for folks that are eating fish -- fish fillets, especially.

16 But, again, these kinds of samples, at least at this point,

17 are not very temporally or spatially robust. It's one

18 sampling point or two sampling points. So we are going to

19 continue to do that, continue to monitor fish and crayfish,

20 frogs and other things. We got a whole bunch of aquatic

21 samplings that we've been collecting, and they're sort of in

22 the queue as far as analysis goes.

23 We made a lot of progress on the aquatic side

24 this past summer, but haven't made nearly as much progress on

25 terrestrial side. And certainly one of the questions we want

1 to answer is are the small animals that occupy these areas
2 also at risk of being exposed to perchlorate. Summertime in
3 Central Texas is not a good time for collecting sentinel
4 organisms unless your sentinel organism is a grasshopper, a
5 spider or some fire ants. So we've attempted to do some
6 terrestrial collections but without a lot success. Now, after
7 the weather cools, we are going to be collecting small
8 animals. We'll be doing some netting for birds. We did
9 collect some doves. We had a chance to shoot a few doves one
10 weekend when we were here. And seed-eating birds may be at
11 risk because perchlorate tends to get into plants and
12 accumulate on seeds. So we haven't got a chance to analyze
13 those birds yet, but they are also in the queue.

14 And with that, I'll turn it over to
15 Dave Ebersold. Thanks.

16 MR. EBERSOLD: Thank you, Todd. Good evening.
17 Brian mentioned that we've been working on -- Montgomery
18 Watson Harza's been working on perchlorate issues for some
19 time, and I thought I would give a brief overview of a little
20 of that.

21 We were involved with the California Department
22 of Health Services and Environmental Protection Agency in the
23 development of the initial laboratory protocols for analysis
24 of perchlorate. We have also done work with the American
25 Water Resources Association in evaluation of treatment

1 technologies with perchlorate in drinking water applications.
2 This is in a lot of ways a lot different than applications for
3 environmental cleanup. Drinking water has a number of unique
4 things about it that don't have to be dealt with in
5 environmental cleanup applications.

6 And we've been working with agencies like
7 [unintelligible] in the evaluation of contamination of
8 groundwater basins, and most importantly, I've been working
9 closely with this group here for about two years now. So it's
10 nice to see a lot of familiar faces.

11 What I would like to do is go through kind of an
12 overview of what we're doing in this project. The benefit of
13 this overall project is to provide a comprehensive evaluation
14 of potential impacts on human and environmental health, as
15 you've been hearing a lot about that tonight. I hope to get
16 into some detail about what that means. So here it is.

17 You've seen maps that show streams flowing off
18 site. One major question is how do those waters mix as it
19 goes through the river system. Is that mixing uniform?
20 Perchlorate dilutes as it moves down the systems. That's
21 what's thought to happen to it. Is that safe in light of the
22 new information that's coming out about perchlorate? Does
23 perchlorate accumulate in the lakes? The lakes act like big
24 sinks, and this watershed system -- Lake Waco and Lake
25 Belton -- all the water from these streams flows in there.

1 And does perchlorate flow in at the same rate as it flows out
2 or does accumulate there, or does it get trapped somehow?
3 What's happening with it?
4 And how does perchlorate that's already off the
5 end site travel in groundwater system? Does it mimic the
6 stream flow patterns, or does it go somewhere else? What are
7 the flow directions associated with that? Those things are
8 pretty well known at the NTWIRP site itself, but what happens
9 when we start to move out into a thousand square miles of
10 watershed? Around this thing you keep hearing about, does
11 perchlorate pose a risk to human and environmental health?
12 What we really mean there is it safe to eat fish; is it
13 safe to drink the water; is it safe for kids to swim in the
14 lake; is it safe to go water skiing, all the things that go
15 along with living in this great environment and having these
16 incredible resources. Everyone here wants to make sure those
17 things are safe to do.
18 So this is, again, a map of the NTWIRP site and
19 the point of this is just to remind you that the areas of
20 perchlorate contamination are centered here and generally
21 flows off site through the stream system. One of the ways we
22 talk about how perchlorate moves is through a thing called a
23 conceptual transport model. And this is a -- when we say
24 "conceptual model," it's just a way of saying how do you --
25 how do we, in our minds, work through the process? And what

1 this shows -- find the button -- I'm going to turn my back to
2 you for a second if I can crouch down so I don't cast a
3 shadow.

4 Perchlorate source is up here in the ground
5 surface and in the shallow soil. And as long as it doesn't
6 rain or get wet, it sits there. And when it does rain, it
7 works its way into the stream system through runoff, or it
8 works its way down into the shallow bedrock system. Now, when
9 water -- this is the groundwater on the surface right here --
10 and this is in a period -- a relatively dry period so the
11 water level is low. And it's probable that in this situation
12 stream water works its way down through these fractures and
13 may provide some recharge for groundwater. This is probably a
14 period of time when springs are dry. You don't see a lot of
15 flow in them, and there's maybe not a lot of perchlorate
16 generation. But then the water levels rise in the rainy
17 season and the wet season and we see disassociation of
18 perchlorate -- mobilization of perchlorate in the water
19 system. And then we see an [unintelligible] perchlorate
20 detectable in springs and stream systems. And perhaps in this
21 situation there'll be groundwater discharge through the
22 streams. And this alternating system of the water level
23 moving up and down is thought to enhance the migration of
24 perchlorate in this type of a system.

25 This is what is thought to happen on the site.

1 And one of the big issues that we are dealing with is this
2 model applicable when we start to look off-site at perchlorate
3 in a big watershed area.

4 Parts of the conceptual model that aren't put
5 together yet that we are dealing with are what happens to the
6 lake system, what happens in the streams. How does that
7 interact with the groundwater system? How do you link that
8 back to the site? These are really complicated issues that
9 we're working to get our arms around on this project.

10 So when we talk about the study area -- I think
11 you saw this map before, but I am going to go through it once
12 again because it's a pretty huge area. Lake Waco's up at the
13 top. The study area boundary kind of comes across this area
14 and then down the west side of the study area along down to
15 Fort Hood, wraps around the south end of Lake Belton and up
16 around Temple and then basically up the I-35 corridor back to
17 Lake Waco.

18 There are two distinctive different watersheds
19 here you keep hearing about. This is the watershed divide,
20 which means everything below here flows down to Lake Belton
21 and everything above that line flows to Lake Waco. And those
22 two lakes act very differently from the other. There is a --
23 they're very different lake systems in how they behave, and
24 that's another complication.

25 So what we're doing specifically is collecting

1 and reviewing existing data throughout the watershed,
2 identifying data gaps -- what isn't known based on existing
3 data -- developing a field investigation program to address
4 those data gaps, developing a geographic information systems
5 and manage all the data, developing this watershed conceptual
6 model, doing some modeling of perchlorate fate transport,
7 ecological and toxicological assessment that you heard Todd
8 talk about, and then project reporting.

9 What we've accomplished so far is development of
10 a project web sites for public access. And here is the
11 address and it's also on the handouts outside.

12 We conducted a number of interviews with
13 community leaders, including some folks in this room. We've
14 collected and reviewed over 300 different reports, study maps
15 and other documents. And we are still collecting information.
16 We developed a project data report repository and an
17 electronic data base, initiated the development of the
18 conceptual model, and initiated the development of the
19 geographic information system.

20 Upcoming milestones include completion of the
21 watershed conceptual model -- or at least the first cut, if
22 that, by the end of this year -- initial evaluation of fate
23 and transport in early 2002, and completion of the geographic
24 information system also in 2002.

25 And with that, I'm going to turn it back to

1 Brian.

2 MR. CONDITE: Thank you, Dave. As Dave
3 mentioned, we have copies of all the slides out on the table.
4 As you leave, you can pick them up. We also have a single
5 page if you don't want to carry so much paper, just has the
6 two slides on it with all the web sites. You might be
7 interested in it if you are interested in computers and
8 surfing.

9 I open up the floor to questions from the
10 audience. Does anybody have any questions they would like any
11 of the participants to answer? Ask the speakers come up here
12 so we can talk at the microphone.

13 Yes, ma'am?

14 UNIDENTIFIED FEMALE: In the toxicology studies
15 you gave you said that you had exposed fish to concentrations
16 of perchlorate. What concentrations were the fish exposed to?

17 MR. CONDITE: I think that's a question for Todd.
18 She's asking if we exposed fish to certain concentrations of
19 perchlorate, what concentrations have we exposed them to.

20 MR. ANDERSON: My role on the project is also on
21 the analytical side, so I can't talk specifically about
22 numbers. But they are environmentally relevant concentrations
23 of perchlorate, meaning that we don't expose fish to
24 concentrations that we've never detected out in the
25 environment. They are concentrations that we find in the

1 water and in various places. Most of those fish studies we've
2 done to date have been in the laboratory. They've done on
3 our -- the other projects we have related to perchlorate is at
4 the Long Horn Army Ammunition Plant in east Texas. And the
5 frog studies we do, the fish studies that we've done, those
6 exposures, again, are concentrations of perchlorate that we
7 find at that facility. And it's not terribly different than
8 concentrations that we found in some of the flowing water.

9 UNIDENTIFIED FEMALE: But you've found
10 concentrations, I guess, ranging from 400 to 500 ppb? That's
11 [unintelligible]

12 MR. ANDERSON: Yeah. That means that it takes a
13 whole bunch of tanks and a whole bunch of fish in a big room
14 to house all of them. We try and bracket the concentrations.
15 So we do go over several orders of magnitude from those
16 exposures.

17 MR. CONDITE: Yes, ma'am.

18 MS. WALRATH: My name is Stephanie Walrath. I
19 work for the environmental division at Fort Hood. My
20 question -- I had a separate question, but you lead me to
21 another one.

22 MR. CONDITE: Only one per customer.

23 (Laughter.)

24 MS. WALRATH: I get the impression the fish that
25 were being analyzed for ecological data were being taken from

1 areas where you detected perchlorate and not in laboratory
2 exposure so they have a more realistic potentially chronic
3 exposure rather than short-term lab exposure.

4 MR. CONDITE: I think Todd was referring to other
5 work at that time at the university --

6 MR. ANDERSON: We're doing both. The major focus
7 of this work is sort of field oriented. The major focus of
8 previous work that we've done have been laboratory oriented,
9 in transition from the field. But we do have ongoing
10 laboratory studies related to this project, as well as the
11 field stuff that we do.

12 MS. WALRATH: One more. I worked a little bit in
13 North Carolina in [unintelligible] River, and at that time
14 that I was there they were looking at some [unintelligible],
15 something very small, that were responsible for fish kills.

16 And there were also neuro-toxicity for human health exposure.

17 And [unintelligible] work with is very small, as you were
18 saying, fish heads were especially because you can't get a
19 sample from the lean parts of the body. My concern is if you
20 were talking about something that is bioaccumulative, it isn't
21 going to show up in fish heads, where it may show up in liver
22 or kidney or adipose tissue or fat tissue or something that is
23 a source of [unintelligible] unless you've already -- you've
24 discovered that brain tissue or some mysterious other smaller
25 tissue had -- but for my -- my curiosity is why would that be

1 an allowable item to test?

2 MR. ANDERSON: I think that the evidence on
3 perchlorate bioaccumulation -- I'm not real convinced about.
4 I think it does seem to accumulate. But then in exposure
5 studies that we've done, it goes -- animals that go into clean
6 water, for example, at least on the developmental side, the
7 effect that you see for perchlorate you don't see those any
8 more. Okay? It's not a real lipophilic contaminant in the
9 sense of classic -- like EDT or [unintelligible] compounds
10 that tend to accumulate in the fat tissue. You know, it just
11 doesn't behave like that. In any tissue -- or if it
12 accumulates in one tissue it's got the thyroid tissue. So
13 that's why we focused on the heads of these organisms. But we
14 also -- in the fillets we collected in August and September,
15 we also collected liver. And liver is a great organism for
16 doing any kind of toxicological examination. And it's really
17 useful for looking at biomarkers of exposure, not trying to
18 detect perchlorate, but trying to detect the impact that
19 contaminants have -- have there been some impacts at least on
20 the liver and some of the biomarkers you can measure.

21 So I don't think we're barking up the wrong tree
22 as far as the tissue we are collecting in the analyses we are
23 doing. I think covering these based on properties of
24 perchlorate and how it behaves.

25 MR. CONDITE: There must be more questions. Yes,

1 sir.

2 MR. HUCKFIELD: My name's David Huckfield
3 [Phonetic] Dr. Honeycutt, would you describe briefly what
4 spurred the decision to lower the interim-action level and
5 what the basis of that was?

6 MR. HONEYCUTT: Well, it was a series of things.
7 It wasn't just one factor. Whenever the Interagency
8 Perchlorate Steering Committee first came about and funded
9 some studies, it came up with a provisional -- actually it's
10 interim provisional reference dose back in '98, I believe it
11 was -- that at that time was the best site available for
12 developing acceptable levels for perchlorate. And that's what
13 we used the 22 number with. And that went through a peer
14 review -- an external peer review where it was decided, well,
15 maybe we need to do a few more follow-up studies to nail it
16 down a little better. And the thinking at that time was those
17 studies would raise the level.

18 And looking at the work that's been done, it's
19 not clear that that's going to happen, that the level would go
20 up. It's looking more like the level will stay the same, or
21 it could potentially even go down. So at that time the EPA
22 went back and said don't use this new reference dose, use our
23 old reference dose range. And if you use that old reference
24 dose range, you come up with a range of acceptable values
25 between that range from 4 to 18 ppb. At that time we would

1 have set it at 18 ppb. So we just kept it at 22 because

2 really there is no difference between 18 and 22 ppb.

3 Now EPA is saying, well, now use the lower end of

4 that range, don't use the upper end of that range. So that

5 was one factor.

6 Another factor is one of the facilities we've

7 alluded to in these talks, the Air Jet Facility out in

8 California has recently -- or the EPA has recently set a

9 cleanup value and a discharge value at 4 ppb for perchlorate

10 at that facility. And the EPA [unintelligible].

11 Another factor is that perchlorate is showing up

12 in fish where we really wouldn't have thought that would have

13 happened. And the data is not really firm enough to

14 quantitatively assess if we've got this level of perchlorate

15 in the water, we'll have this level of perchlorate in fish.

16 The data's just not there, but it is waving a flag. So when

17 we combine all those factors together, we approved to go to 4

18 being the lower end of that range.

19 MR. CONDIKE: Yes, ma'am.

20 UNIDENTIFIED FEMALE: This question is for

21 Dr. Anderson. What's the minimum detection level of

22 perchlorate in 2002, and what is the standard deviation at

23 these lower levels and in the detection limit in water other

24 than in tissue?

25 MR. ANDERSON: The detection limit in water or

1 tissue?

2 UNIDENTIFIED FEMALE: Let's do water first and
3 then tissue.

4 MR. ANDERSON. The detection limit is about 2 ppb
5 in water. Tissue detection limits vary. To calculate the
6 limits of detection you must calculate the size. You compare
7 the size of the analyte [Phonetic] peak that you're looking at
8 to the background. And the background tends to vary,
9 depending on whether you are doing -- at least in our
10 experience -- whether you are doing tadpoles or frogs, or
11 whether you're doing blood, or whether you're doing muscles or
12 doing heads. I think, if I remember right, the limit of
13 detection that we calculated based on fillet data was about
14 190 ppb. So anything below that, you wouldn't see this in a
15 fillet. That's -- I think that's a wet weight calculation.
16 So it's not nearly as good as what it is in water.

17 MR. HONEYCUTT: One thing to note, Todd's a
18 researcher. I'm a regulator. There is two different values
19 that we look at when we talk about analytical information.
20 One is detection limit and one is quantitative limit. A
21 detection limit is what you see of the background. And
22 quantitation limit is what can be allowed to quantitate.
23 Right now there is an EPA method that's out that people
24 routinely use for quantifying perchlorate, and that
25 quantitation level is 4 ppb.

1 MR. CONDIKE: Mayor.

2 MAYOR MARSHALL: Mike when we started this two
3 years ago, we were dealing with the Navy Department. When did
4 the Corps of Engineers come into the picture?

5 MR. MEADOWS: In the funding that Chet Edwards
6 got together with the water energy funding, and that is where
7 he funds it through the Corps to form this team. And, of
8 course, the Corps has both of these lakes so they have an
9 interest in the study, also.

10 MAYOR MARSHALL: How long has this team been
11 together?

12 MR. MEADOWS: February this year.

13 MAYOR MARSHALL: February this year. Okay.
14 Mike, am I right, in the beginning you were trying to stop the
15 water and perchlorate from coming together and all that sort
16 thing? Wasn't that the first issue?

17 MR. MEADOWS: Actually, the Navy did that. On
18 this map -- and the map in this area -- back area -- the Navy
19 conducted several thousand feet of -- good term "French
20 drain" -- buried pipe that would collect water. And they
21 collected that water pumping it back up to some lime lagoons
22 and then treating now through this ionic exchange system and
23 discharging it.

24 MAYOR MARSHALL: Are we still doing that?

25 MR. MEADOWS: Yes, sir, they're still doing that.

1 They're doing that. And then they added some additional
2 lagoons that can catch more water. That French drain system,
3 they also put the substrate in that to allow that
4 bioremediation to take place -- actually under ground
5 treatment. So they have a dual treatment system of
6 bioremediation and the ionic exchange of the water they pump
7 up. Back in that area they have done a lot of work and kind
8 of gotten it set up where the water that they treat are below
9 the detection limits there. They've done a good job.

10 MAYOR MARSHALL: How about wells that are around
11 here?

12 MR. MEADOWS: Not anything been done on those
13 wells off site. I was talking to some folks here on the team
14 today about the new standards, what that'll require of the
15 Navy. They may have -- I don't know this, I'm just
16 speculating -- may have to move off site or do remediation in
17 the shallow ground waters. These are deep wells. These
18 aren't community water wells.

19 MAYOR MARSHALL: I feel good you got a good team
20 together, but is 8,000,000 going to do it? How much of that
21 money have we spent already?

22 MR. MEADOWS: Well, the first years the funding
23 is \$4,000,000. We're well into the project. It was a little
24 late kicking off just because of funding from Washington. You
25 know how it is. They give you money, but it takes you a

1 little while to get it. And that's going to carry us actually
2 through the first of the year, a little past that. And this
3 year's appropriations -- currently they have 2.5 million in
4 the budget for next year. As we identify needs in the study,
5 I think the opportunity to get additional funding as time goes
6 on will become much easier if it's needed.

7 MAYOR MARSHALL: This time next year we'll be
8 around third base going home, do you think?

9 MR. MEADOWS: I think it's looking real good.

10 MAYOR MARSHALL: Again, I want to thank our
11 Congressman Edwards. He's been very helpful --

12 MR. MEADOWS: Yes, sir.

13 MAYOR MARSHALL: -- in getting this accomplished.

14 MR. MEADOWS: That's right. With the work that
15 Texas Tech is doing in helping identify the bioaccumulation
16 and what's going on in the environment, that was just the
17 thing TNRCC needed along with what's happening in California
18 to bring that allowable number down. When that happens, it
19 kicks in more remediation that the Navy has to do on a much
20 faster scale.

21 MR. CONDIKE: Yes, sir?

22 UNIDENTIFIED MALE: What is the relationship
23 between your study and the findings they come up with in the
24 Navy and the treatment that's been done in the study?

25 MR. CONDIKE: The reason for our study is that we

1 are concentrating more on the overall potential impact of
2 perchlorate that might occur on the entire two watersheds.
3 The Navy's focus is primarily to transfer the land to, to
4 release the land from the Navy and get it back to the city.
5 So they are trying to identify what problems that may exist on
6 the Navy property and clean it up if necessary, get it down to
7 the levels the State will permit, and then release the land.
8 And they have done a lot of work outside the fence, so to
9 speak. But that is not really their focus. That's what our
10 focus is.

11 We are working in cooperation with the Navy, as
12 far as data sharing goes. We have an open data sharing
13 arrangement, and they provide with us all their data and
14 anything we develop we'll provide to them as well. So we are
15 not trying not to duplicate our efforts and waste taxpayers'
16 dollars. We consider our study to compliment what they're
17 doing, do something in addition to what they plan to do.

18 UNIDENTIFIED MALE: [Unintelligible].

19 MR. MEADOWS: Yes, sir. That's a role the Brazos
20 River Authority will play. As we get information in the
21 study, we'll get all of the Stakeholders back together and
22 pass that along. I send quite a bit out on e-mail. We will
23 have quarterly and semi-yearly meetings. Sure will.

24 UNIDENTIFIED MALE: Well, you done a good job.

25 MR. CONDIKE: Yes, sir.

1 UNIDENTIFIED MALE: I think Dr. Anderson talked
2 about hits in Willow Creek and South Bosque and Station Creek.
3 You said the hits were higher when you have the higher flow.
4 But you also said that it seems to be diluted when you go
5 downstream. If that was diluted, wouldn't it be higher
6 instead of lower?

7 MR. ANDERSON: You probably misunderstood, or I
8 didn't make myself clear. We have collected water data from
9 several places. And the three places that I showed were just
10 three places that I showed. Those aren't necessarily the same
11 places where we collected fish. The South Bosque, yes, that
12 we collected fish from there and that's -- at least in May and
13 in -- and in August and September. Station Creek at 107, we
14 didn't collect fish because there isn't a pool there to get
15 fish. We collected fish at the biggest pool area, which is
16 closer to where it drains into the Leon River. So there is
17 that.

18 I think the other part of your question was about
19 detecting perchlorate, the variation during different times of
20 the year, when there is flow, when there is not flow. The
21 North Branch of the South Bosque is an area where we pick up
22 perchlorate at high concentrations, but also an area during
23 the middle of the summer where there isn't flow. Willow
24 Creek, there's always flow in Willow Creek. The South
25 Bosque -- the south range of the South Bosque, as we call it,

1 for the most part there is flow all year around. There are a
2 couple instance where there's not.

3 I think what I was trying to get at is the north
4 branch of the South Bosque and the south branch of the South
5 Bosque come together at a spot called Indian Trail. And we
6 sampled there. And in a lot of case we haven't picked up
7 perchlorate. But when we shocked fish from there we did find
8 perchlorate in the head tissues. So there is -- I don't know
9 if I'm answering your question -- but one of the things that
10 Montgomery Watson is trying to understand is, are there places
11 where there's, you know, proposing [phonetic] of groundwater
12 with surface water, and is that what's causing hits in some
13 places and not hits in other places, or is it strictly a
14 [unintelligible].

15 We can't do anything to improve our detection for
16 water, so if we don't detect it, we don't detect it. Other
17 than oiling the water and trying to concentrate it at some
18 level, you really can't do much to increase the detection
19 limits.

20 MR. CONDIKE: Yes, ma'am.

21 UNIDENTIFIED FEMALE: I was just wondering. Is
22 there a portion of the investigation that's also looking at
23 different -- bioremediation? Are there other alternative
24 [unintelligible]

25 MR. CONDIKE: We really aren't looking at

1 remediation. At this point, we don't know that there's a need
2 for remediation. If, certainly, there's a need for
3 remediation at the NTWIRP facility, maybe need some in that
4 area. That's the Navy's decision. They are trying different
5 things. Being very innovative in their approaches.

6 Mayor Marshall mentioned something about wells.

7 There are two different kinds of wells out there. There are
8 groundwater monitoring wells that we are collecting samples.

9 But we also have ground water interceptor wells where they put
10 in this bio-mesh stuff where they are trying to treat the

11 perchlorate with these fingers in wells sticking in the mound,
12 and the groundwater flows to it and intercepts the groundwater
13 and treats it -- sort of porous fences in wells. So they are
14 trying these quite novel approaches to doing this.

15 Yes, sir.

16 UNIDENTIFIED MALE: How long ago did the Naval
17 Plant start working with the ammonium perchlorate? What I'm
18 wondering is how long has it been exposed to the environment
19 and available at the runoff site, a few years or a few decades
20 ago?

21 MR. CONDIKE: Started in 1952, maybe.

22 MR. MEADOWS: Back in the 50s. [Unintelligible]

23 I have that chronological order for you.

24 UNIDENTIFIED MALE: We've been exposed at the
25 plant for decades at the runoff site?

1 MR. MEADOWS: Well, they've been using it during
2 those periods, yes, sir. Not necessarily exposed runoff.
3 [Unintelligible].

4 UNIDENTIFIED MALE: Still, even in the '70s seems
5 like a long time. It doesn't seem to have gone around -- you
6 haven't done any tests on Lake Belton.

7 MR. MEADOWS: Well, David is a geologist, but I'm
8 going to give you an un-geological term. In the soil there is
9 1.2 million ppb of perchlorate. Groundwater doesn't move real
10 fast. It moves five feet a year.

11 Dave's a lot smarter than I am. But it's a
12 couple of thousand feet from the area they measured it. So
13 really areas haven't transferred that much. What we're seeing
14 is what's in groundwater comes up, it flushes it out and
15 pushes it out, or from water hitting the surface and then
16 running off -- strong water.

17 The Navy's been very -- done a lot of work making
18 sure of actually moving that soil and remediating that soil to
19 stop it from runoff.

20 UNIDENTIFIED MALE: So if they're doing these
21 remedial processes there, it seems like you wouldn't expect
22 the situation to get worse in the study area.

23 MR. MEADOWS: The only thing is, all of the work
24 that's been done right here, there's not been any work done on
25 site remediation of any other sites. The 238 acre landfill

1 right here that hasn't been investigated. So there's still
2 9000 acres to look at.

3 UNIDENTIFIED MALE: So the answer is no
4 contaminants really, no [unintelligible]

5 MR. MEADOWS: No. They they're working very
6 hard.

7 MR. EBERSOLD: Follow-up answer. There's a
8 number of duct wells downstream in this area off site.
9 Generally [unintelligible] is number one. And we know
10 concentrations in the shallow groundwater system there are
11 reported around 1500 ppb. Downstream here at number 10 the
12 concentrations are at least 190 ppb. And that's essentially
13 where Station Creek joins the flood pool of Lake Belton. So
14 it's -- that's a fair distance there, about seven or eight
15 miles.

16 And then there is a detection in the system from
17 Harris Creek moving downstream through here. These numbers
18 downstream around four and six are about the [unintelligible]
19 but that's quite a ways in a system that should be diluting.
20 Sporadic detections in Lake Belton and one below the outlet in
21 Belton.

22 UNIDENTIFIED MALE: [Inaudible]

23 MR. EBERSOLD: Yes.

24 UNIDENTIFIED MALE: [Inaudible]

25 MR. EBERSOLD: Yes, not sustained detections. In

1 other words, they go out -- these are Navy samples. They go
2 out and detect it. Then they have a process of doing
3 confirmation sampling. So after a few week, before they get
4 out for confirmation sampling, they might be surprised to see
5 it again in a confirmation sampling. If the number is that
6 low because the lakes are very [unintelligible] in the system
7 [unintelligible] So -- but those are the numbers they are
8 reporting.

9 UNIDENTIFIED MALE: Do you know offhand what the
10 concentrations were in those lakes -- 'cause all the maps
11 [unintelligible]

12 MR. MEADOWS: The Highway 36 bridge in Lake
13 Belton 8 ppb, but below the Lake Belton Dam is 6 ppb. I think
14 if they found in Lake Mead [unintelligible] perchlorate as
15 part of the study is [unintelligible] sample, the subsurface
16 flow currents in these reservoirs -- both of them -- Lake Mead
17 [unintelligible] in one location information contact at 100
18 yards over would be 150 parts. So the key, if we want to
19 develop, is where do you sample if you have true readings of
20 what might be the effects.

21 MR. CONDIKE: Some more questions? Yes, sir.

22 MR. JONES. My name is Michael Jones. My
23 question would be every time you get a hit -- or do we always
24 assume it came from the Naval Base and not from some other
25 source?

1 MR. CONDIKE: We don't -- we're not making
2 assumptions at this point. But we do have one serious hit in
3 the Cowhouse Creek arm of Lake Belton. Point that out, Dave.

4 And we would not expect that to be part of the
5 flow regime to come downstream from the NTWIRP Plant, so we're
6 not sure where that comes from, not sure whether that is a
7 true hit or not. I think that was in the [unintelligible]

8 So we're not making any presumptions. It's
9 possible that someone's using fertilizer from Chili and it's
10 got perchlorate in it. That's one of the things we're trying
11 to determine in our studies and trying to understand the flow
12 regimes to determine where things are coming from and where
13 they are going. That's the transport part of the -- the fate
14 transport model.

15 MR. JONES: So possibly be coming from testing on
16 Fort Hood that may be continuing right now.

17 MR. CONDIKE: We don't have any evidence to that
18 effect, but anything's possible. Got some folks here from
19 Fort Hood. I know -- I know Fort Hood has independently
20 collected some samples from surface water. I understand they
21 came back non detect. That's the last I heard on that.

22 UNIDENTIFIED FEMALE: Have the detection of
23 perchlorate always been near an ammunition site or -- because we
24 put perchlorate in laundry -- dry laundry detergents.

25 MR. CONDIKE: I'm not sure that's true.

1 UNIDENTIFIED FEMALE: [Unintelligible] Sodium
2 perchlorate. It's perchlorate.

3 MR. CONDIKE: Chloride.

4 UNIDENTIFIED FEMALE: But this was a perchlorate,
5 Solvay [phonetic] Chemical, Houston Texas.

6 MR. MEADOWS: We know for sure there's not one of
7 those plants in these two parts here.

8 UNIDENTIFIED FEMALE: No, there's not one here,
9 but that's why I was asking. Do we always find perchlorate --

10 MR. MEADOWS: Been some found -- I mentioned
11 earlier perchlorate is used in air bags. It was found in
12 California with perchlorate at that factory. Whether there's
13 perchlorate near runoff, whether it's your source or air bags
14 or munitions plants that used it as part of a propellant, yes,
15 ma'am.

16 MR. CONDIKE: Did I see another question? Yes,
17 sir.

18 UNIDENTIFIED MALE: Has it been determined how
19 many parts per billion concentration in the thyroid gland
20 causes endocrine disruption disfunction?

21 MR. CONDIKE: That's not my area. Today? Mike?
22 On humans, or...

23 UNIDENTIFIED MALE: Just in humans.

24 MR. HONEYCUTT: That's very hard to say. There
25 have been occupational exposure studies, and actually -- I

1 mean, this used to be used as medicine. I mean, people with
2 thyroid -- hyperthyroidism -- used to be treatment for
3 hypothyroidism. So it's very hard to say. The effect that
4 the reference dose is based upon is the protection of the
5 fetus in a pregnant woman. And the -- the connection between
6 how much the person digests and then the effect is what this
7 reference does is based. And it's -- and that's very hard to
8 determine. And a right now the best we have is 4 ppb as an
9 acceptable level.

10 Now, what level will cause health problems, I
11 don't know. It's going to be a lot higher than 4, but exactly
12 what that level is, I don't think anyone can tell us.

13 UNIDENTIFIED MALE: Thank you.

14 MR. HONEYCUTT: We feel pretty comfortable 4
15 parts is okay, would not cause an effect.

16 MR. CONDIKE: Judge Burrows from Bell County came
17 in to join us. Thank you, sir.

18 Are there any other questions?

19 MS. WALRATH: Is there a --

20 MR. CONDIKE: Is this question four now?

21 (Laughter.)

22 MS. WALRATH: Is there lowest observable effect
23 level established for perchlorate?

24 MR. CONDIKE: The lowest observable effects level
25 established for perchlorate.

1 MR. HONEYCUTT: Actually in the recent EPA
2 studies, they didn't find the low level but they used the NO-L
3 [phonetic]. No-L means no level. But, no, they didn't test
4 on the level in which NO-L was demonstrated for the effects
5 that they looked at. I mean, there were other effects they
6 found.

7 MS. WALRATH: Were the low levels established,
8 and the effect you talked about pregnant women and fetus --

9 MR. HONEYCUTT: Well, not pregnant women, but
10 pregnant mice.

11 MR. CONDIKE: And not -- as David said earlier --
12 pregnant elephants. I think there is another reason we don't
13 test elephants.

14 MR. EBERSOLD: Don't pin the elephant on me.

15 MR. CONDIKE: I'm sorry. I can't imagine a
16 biology lab with 200 elephants in cages.

17 There was another question -- hand raised
18 tentatively. Someone got embarrassed. Any more questions?

19 Well, thank you very much for attending. You've
20 been a very patient audience. I hope we all learned something
21 here, and I know we gained a lot from you.

22 And we will hang around here if you want to talk
23 to us individually. And we will be having more meetings like
24 this, and we will let you know through the press and through
25 our website.

1 Thank you very much.

Bosque and Leon Rivers Perchlorate Study
Public Meeting at Waco High School
10/15/01

Name	City & State	Zip Code	Public official (with title), property owner, or company representing
Cristi Hicks	Temple, Tx	76504	NA
Sam A. Listi	Belton, Tx	76513	City Manager of Belton, Texas
Ralph Gauer	Belton, Tx	76513	Texas State Senate District 24
Kip Averitt	Waco, Tx	76702	Texas House of Representatives
Kirsten Ward	Waco, Tx	76706	Baylor Student
Phil Cuevas	China Spring, Tx	76633	NA
Stuart Williams	Waco, Tx	76706	Baylor Student
Juanita McGahan	Waco, Tx	76798	NA
Charles Anderson	Waco, Tx	78710	Property Owner
Brooke Adams	Waco, Tx	76706	Baylor Student
Jenny Kife	Waco, Tx	76798	Baylor Student
Frank Burleson	Waco, Tx	76716	TNRCC
R.E. Wallace	Waco, Tx	76702	Seven Cities Engineer
Seth Witcher III	Waco, Tx	76706	Baylor Student
Lacy Frazier	Waco, Tx	76798	NA
Song Ya	Waco, Tx	76798	NA
Charles E. Ferguson	China Spring, Tx	76633	City of Waco
Larry L. Lehr	Waco, Tx	76710	Baylor University
Win McAtee	Waco, Tx	76710	Trinity Engineering / Kleinfelder
J.Tom Ray	Waco, Tx	76710	LAN
John D. Lestuck	Hewitt, Tx	NA	Property Owner
Michael Von Euw	Waco, Tx	76706	Baylor Student
Holly DoRemus	Waco, Tx	76706	Baylor Student
H. Louis Fleischhauer	Waco, Tx	76703-1994	Trinity Engineering
Elaine Alexander	Waco, Tx	76710	TNRCC - Region 9
Anna Dunbar	Waco, Tx	76710	TNRCC
Diane Massey	Waco, Tx	76710	TNRCC
Wilson Snyder	Waco, Tx	76710	TNRCC - Region 9
Melissa Mullins	Waco, Tx	76707	TPWD
Brandon S. Emmons	Gatesville, Tx	76528	City Manager of Gatesville, Texas
Fred Lamb	Waco, Tx	76712	NA
Linda Ethridge	Waco, Tx	76702	Mayor of Waco
Dr. Joe C. Yelderman Jr.	Woodway, Tx	76712	Baylor University Professor
Greg Ross	Waco, Tx	76706	NA
Dr. Owen Lind	Waco, Tx	76798	Baylor University Professor
David Paul Cunningham	Waco, Tx	76706	Engineering Student
Heather Shipley	Waco, Tx	76798	NA
Jeff Rotkoff	Waco, Tx	76706	representative from Congressman Chet Edwards Office
Larry Warren	Gatesville, Tx	76528	NA
Valerie Oppel	Waco, Tx	76706	Baylor Student

Bosque and Leon Rivers Perchlorate Study
Public Meeting - Temple, Tx
10/16/01

Name	City & State	Zip Code	Public official (with title), property owner, or company representing
John Burrows	Belton, Tx	76513	Bell County Judge
Mark S. Watson	Temple, Tx	76501	City Manager of Temple, TX
Steve Renbish	Round Rock, Tx	78664	NA
Don Wyrick	Waco, Tx	76710	TNRCC
Marie Martch	Belton, Tx	76513	CUWCD
Redmond Jones	Temple, Tx	76501	City of Temple
Gary Scott	Belton, Tx	76513	NA
Mary Gauer	Harker Heights, Tx	76548	Mayor of Harker Heights, Tx
Billy Graf	Eddy, Tx	76524	Board Member - Bruceville Eddy Water Dept.
Jay Spence	Irving, Tx	75038	ArSate Inc.
David Tuckfield	Austin, Tx	78701	Vinson & Elkins, and Bell County WCID#1
Michael Jahns	Temple, Tx	76501	Bell County Public Health District
Carl Stevens	Killeen, Tx	76540	Bell County WCID#1
Kim Vetter	Temple, Tx	76504	Killeen Daily Herald Newspaper
Jeffrey M. Basile	Ft Hood, Tx	76544	US Army @ Ft.Hood
Stephanie Walrath	Ft Hood, Tx	76544-5057	US Army @ Ft.Hood
Keifer Marshall, Jr.	Temple, Tx	76544	Mayor of Temple, TX
Bruce Butscher	Killeen, Tx	76540	City of Kileen
Riki Young	Ft Hood, Tx	76544	US Army @ Ft Hood-DPW
John Deering	Austin, Tx	NA	TNRCC
Wallace Bishop	Troy, Tx	76579	Clearwater Underground Water Dist.
Greg Pope	Belton, Tx	76513	U.S.Army Corp of Engineers
Stephanie Gibson	Waco, Tx	76706	represenative from Congressman Chet Edwards Office
Clay Coppedge	Temple, Tx	NA	Temple Telegram
Raymond L. Mucha	Temple, Tx	76504	Former Employee at Plant
Kris Augenstine	Austin, Tx	78768	represenative from Texas Representative Dianne White Delisi's Office
Robert G. Adams	Belton, Tx	76513	Little River Corp of Engineers
Joel J. Day	Troy, Tx	76579	Troy City Council
Anthony Daniel	Temple, Tx	76501	Director of Utilities in Temple, TX